Operating Instructions Industrial Transmission

Gear type: P3K 091 N036 241/VHN

Order No.: IP6203

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ASS AG Switzerland fully complies with the quality and environmental standards of ISO 9001 and ISO 14001. It is the environmental goal of ASS AG to develop products with a minized environmental impact in production, use and waste disposal. Please do not hesitate to contact us if you have any questions concerning environmental aspects in connection with the commissioning of our products.

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1 General Information

1.1 Manufacturer

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1.2 Information on operating instructions

The operating instructions in German language are the original operating instructions. All other languages are translations from the original operating instructions.

These operating instructions are an important source of information and a reference guide for the personnel with respect to operation and maintenance of the transmission. They shall enable safe and proper operation of the transmission.

This requires appropriate knowledge of all safety aspects to be observed during installation and operation as well as maintenance of the transmission. Reading these operating instructions should therefore start with the chapter "Safety". The chapters thereafter are further focal points of information for the personnel.

For the avoidance of operating errors these operating instructions must always be kept near the transmission and should be available for the personnel at any time. The accident prevention instructions and the general safety regulations must be strictly observed when operating the transmission.

The complete technical documentation consists of:

- operating instructions
- technical specification
- dimension drawing
- assembly drawing
- bill of materials
- operating instructions for accessories (if available)
- declaration of incorporation acc. Annex IIB EC machinery directive 2009/42/EG

This technical documentation is part of the transmission delivery and must be available at the point of use of the machine at any time.

Special technical information for the respective transmission type can be found in other documents of the technical documentation (technical specification, dimension drawing, assembly drawing, bill of materials).

☞ *NOTE!*

Descriptions and graphic representations in these instructions may differ from the actual design of the transmission.

These operating instructions must be thoroughly read before installation and commissioning!

1.3 Liability and warranty

All information and notes on operation, maintenance and cleaning of the transmission is provided under due consideration of our previous experience and to the best of our knowledge.

The manufacturer will not assume liability for damage or malfunctions resulting from the non-observance of these operating instructions.

In the course of the ongoing development of this transmission we reserve the right for technical changes without prior notification.

Translations are also done to the bet of our knowledge. We will not assume any liability for translation errors. The German version of these operating instructions delivered with the transmission is decisive.

1.4 Explanation of symbols

Important notes, such as notes on safety, are highlighted by the corresponding symbols. These notes must be strictly followed in order to avoid accidents and damage to the transmission.

WARNING!

In these operating instructions this symbol highlights all notes on safety that need to be observed to avoid the risk of injury or death. Comply with these notes on industrial safety and exercise extreme care in such situations.

WARNING! Danger caused by electric current!

This symbol identifies dangerous situations with electric current. Non-compliance with these notes on safety causes the risk of injury or even death. Necessary work must only be performed by a well instructed electrician.

ATTENTION!

In these operating instructions the "Attention" symbol highlights all notes on safety that must strictly be followed, because their negligence may result in damage to and/or malfunctions of the transmission.

EXPLOSION PROTECTION!

In these operating instructions this symbol emphasizes contents and instructions for the use of the transmission in explosion endangered environments as specified in the ATEX-guideline. The non-observance of these contents and instructions can lead to the loss of the explosion protection.

NOTE!

This symbol emphasizes hints and particularly useful information in these operating instructions. For an effective operation of the transmission all notes should be observed.

1.5 Spare parts

Use only genuine spare parts from ASS AG.

ATTENTION!

Incorrect or faulty spare parts from other manufacturers may cause damage to the transmission.
However, should spare parts other than the genuine spare parts from the manufacturer or spare parts not purchased from the manufacturer be used, all obligations granted by the manufacturer or his dealers, such as warranties, servie contracts etc., will become null and void without prior notification.

1.6 Copyright

These operating instructions must be treated confidentially. It is only to be used by the authorized group of persons. Passing these instructions on to third parties requires the written consent of the manufacturer.

All documents are protected by copyright law.

The distribution and reproduction of documents, even in excerpts, their use and the disclosure of their content is not permitted, if not explicitly specified differently. Violations are liable to prosecution and oblige to compensation.

We reserve the right to impose industrial property rights.

1.7 Waste disposal

– Dispose of fuels and lubricants, conserving and cleansing agents according to the valid environmental regulations.
– Catch running out fluids and dispose of environmentally or, if possible, treat and recycle.

2 Safety

The chapter on safety provides you with an overview of the safety aspects that need to be observed when operating the transmission

In addition to the general notes on safety listed in this chapter, further subject related safety instructions will be given in the individual chapters of this manual, wherever this is necessary. These are highlighted by symbols.

The transmission has been designed and built in compliance with the currently valid technical rules and regulations and is safe to operate.

However, dangers may still arise from the transmission if it is operated by untrained personnel in an unprofessional way or is used for purposes it is not intended for.

In order to avoid dangers for persons and to assure the optimal power of the unit, any changes and modifications made to the transmission require the explicit approval of the manufacturer.

Always keep safety and instruction decals, such as sense of rotation arrows and operation signs on the machine in legible condition. Damaged or illegible decals must be immediately replaced.

2.1 Responsibility of the user

These operating instructions must be available to all personnel entrusted with installation, operation and cleaning at any time!

The user is obliged to ensure that the transmission is only operated in a proper and safe condition. In particular, all safety installations and interlocks must be well accessible and checked regularly for correct functioning.

In the end the user or the personnel authorized by him to work on the transmission within the scope of their duty, is responsible for the trouble-free operation of the transmission.

Any information concerning industrial safety is based on the currently valid regulations of the European Community. In other countries the corresponding laws or country specific regulations must be observed and complied with.

For both the European Community and also for the other countries the user must determine the up-to-date status of all applicable standards.

Besides the notes on industrial safety in these operating instructions, the generally valid safety and accident prevention regulations and the applicable environmental protection regulations must also be observed and complied with.

The user must clearly specify the responsibilities for operation and maintenance and ensure strict compliance with these responsibilities, thus to rule out any unclear distribution of competencies under the aspect of safety.

All information in these operating instructions must be strictly followed!

In particular the user must make sure that

– a risk analysis (acc. to the Employment Protection Act § 5) is carried out to identify any further dangers, which may result from the specific work conditions at the point of use of the transmission.

– all other instructions and safety regulations, resulting from the risk analysis of the work places on the transmission, are gathered in operating instructions (acc. to Equipment Utilisation Regulation (Arbeitsmittelbenutzungsverordnung) § 6).

Non-compliance with these safety regulations will lead to the loss of any compensation claims.

EXPLOSION PROTECTION!

In case of transmissions intended for installation into plants for operation in explosion endangered environments acc. to the ATEX-regulation, the user must ensure compliance with the ATEX-regulation for the overall plant.

Failure to meet this requirement results in the loss of the explosion protection.

2.2 Intended use

The operational reliability of the transmission can only be assured if the transmission is used for the purpose it has been intended for, according to the information in these operating instructions and the technical documentation.

The transmission is solely intended for installation in a machine and must only be used and operated subject to the conditions contractually agreed upon between manufacturer and user.

Intended use also includes compliance with the conditions for installation, operation and cleaning.

Any use beyond these boundaries is considered as unintended!

Any damage resulting from this is the sole responsibility of the user.

The transmission is used in a plant and has no own control. During operation no operating personnel is required. The user must make appropriate provisions for shutting down the transmission when a dangerous situation arises or a fault occurs.

2.3 Personal protective outfit

The following outfit should be worn when working on the transmission:

– Tight fitting clothes (low tear resistance, no wide arms, no rings, etc.)
– Protective goggles
to protect the eyes against flying parts and squirting out fluids
– Safety boots
as protection against heavy, falling down parts and slipping on a slippery floor
– Ear defenders
as protection against hearing damage at sound pressure levels higher than 80 dB (A)

2.4 Dangers that may arise from the transmission

This transmission is of state-of-the-art design and meets all established rules and regulations on industrial safety.

However, there will still be a remaining risk!

During operation the surface of the transmission reaches very high temperatures.

WARNING! Danger of burning!

Danger of burning caused by high surface temperatures of the transmission. Do not touch the transmission during operation. Make sure that the transmission has cooled down to room temperature before starting maintenance and repair work.

The transmission works with rotating shafts.

WARNING! Danger of injury!

Rotating parts can cause severe injury. During operation rotating parts must not be accessible, covers and service hatches must stay closed.

Be aware that rotating parts may continue rotating for a certain time after the transmission has been shut down.

For this reason:

- **Do not remove and covers and service hatches during operation. Do not start operation without the intended covers in place.**
- **Make sure that all machine parts have come to a halt before starting work on the transmission.**

WARNING! Danger of injury!

Depending on rotary speed, power and environmental conditions the expected sound pressure level L_{pA} acc. to DIN 45635 T1 and T23 may be > 80 db(A). Ear defenders may be necessary.

EXPLOSION PROTECTION!

During assembly and disassembly work the environment must be free of explosive gas mixtures and dust concentrations. Failure to meet this requirement may result in the loss of the explosion protection.

EXPLOSION PROTECTION!

If the transmission is to be used in an explosion endangered environment, all attachments must meet the conditions of directive 94/9/EG. Failure to meet this requirement may result in the loss of the explosion protection.

2.5 Emergency Stop switch

The transmission is used in a plant and has no own control. The user is obliged to ensure that Emergency Stop switches are installed in compliance with the applicable accident prevention regulations. The user must inform the operating personnel about the locations and the function of these Emergency Stop switches.

2.6 Operating personnel

The necessary work must only be performed by trained or instructed personnel with appropriate knowledge and experience! Each person entrusted with the installation,

commissioning, operation and repair of the transmission must have read and understood the complete operating instructions, before performing the corresponding work.

This applies also if the corresponding person has already worked with this or a similar type of transmission or has been trained by the manufacturer.

It is recommended that the user receives a written confirmation from his personnel that the content of these operating instructions has been read.

Knowing the content of these operating instructions is a prerequisite to protect the personnel against dangers, to avoid errors and thus to operate the transmission in a safe and reliable manner.

The responsibilities for operation and maintenance must be clearly assigned to avoid any unclear assignment of competences under the aspect of safety.

The user must also make sure that no unauthorized persons perform any work on the transmission.
The operator is obliged to inform the user immediately about any occurring changes on the transmission, which could affect the safety.

3 Technical Description

3.1 Identification

3.1.1 Type plate

The transmission carries a type plate with important technical data.

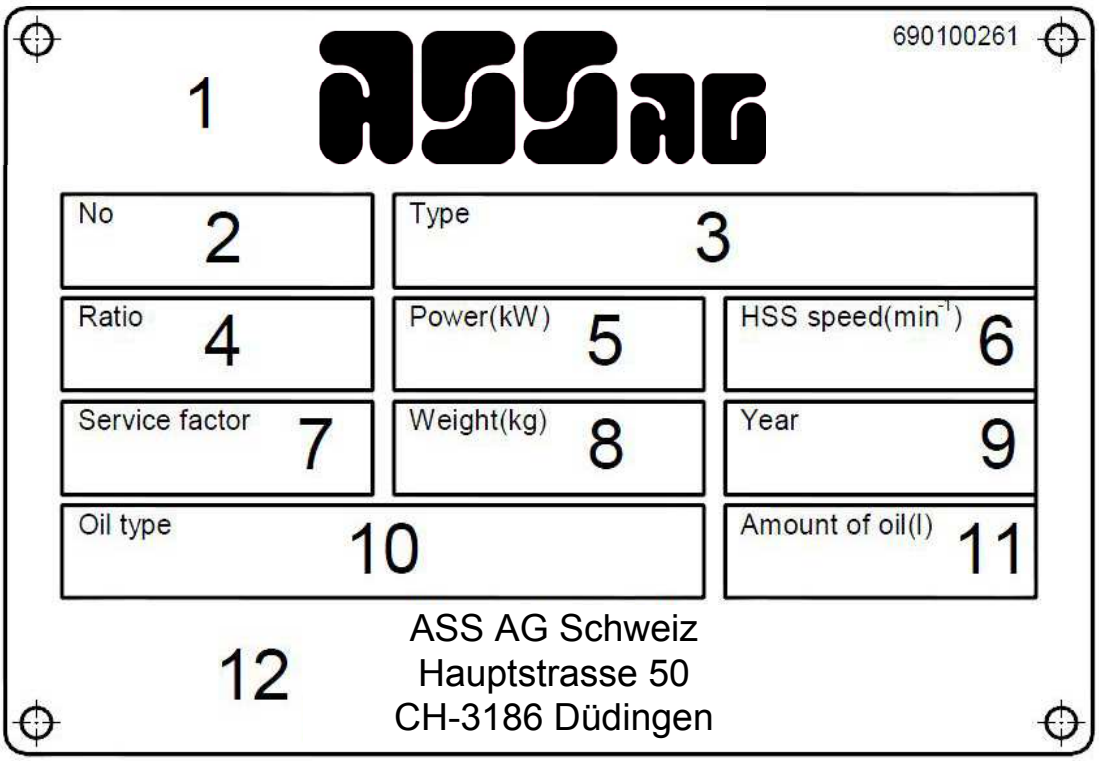

Fig. 1: Type plate (example)

1	Company logo	7	Operation factor
2	Serial number	8	Weight
3	Type designation	9	Year of construction
4	Ratio	10	Oil type
5	Drive torque or output power	11	Oil quantity
6	Drive speed	12	Manufacturer

3.1.2 ATEX- Identification

EXPLOSION PROTECTION!

Transmissions complying with EC-directive 94/9/EC (ATEX) are marked with an ATEX-decal.

Fig. 2: ATEX-decal (example)

Explanation:

CE	CE symbol
Ex	Symbol for explosion endangered atmosphere
II	Equipment group acc. to EC-directive 94/9/EC
3	Category acc. to EC-directive 94/9/EC
G T3	Zone distribution for gas acc. to ATEX, temperature class
D170°C	Zone distribution for dust acc. to ATEX, max. surface temperature
Tamax	max. permissible ambient temperature

3.2 Transmission

All geared parts meet the requirements of ISO6336 / DIN3990 / DIN3992 and have been designed with sufficient safety factors for high durability. For maximum safety and wear resistance ASS AG solely uses case hardened, nitrated, annealed and austempered gear materials.

All necessary bearing points in the transmission are fitted with roller bearings, designed acc. to DIN/ISO 281. All roller bearings are oil lubricated. Depending on transmission design and installation position the transmission may also be equipped with grease lubricated roller bearings.

Torque transmitting components, such as key and groove connections acc. to DIN6885 and splined connections acc. to DIN5480 have been designed acc. to the applicable standards.

The transmission has been designed or selected according to the technical specifications demanded by the operating condition.

The transmission will warm up during operation. The required cooling can be achieved by natural convection, an additional fan or by an oil cooling system. ASS AG tas taken this into account already when selecting your drive and the transmission is therefore equipped accordingly.

The correct transmission oil level is adjusted and monitored by means of oil lug, dipstick or inspection glass. The oil drain plug (see dimension drawing) is used to change the oil.

All shafts protruding from the transmission are sealed by radial seals. Depending on application and design grease filled labyrinth seals or mechanical seals (see dimension drawing) may be used.

3.3 Connecting structure

Depending on the transmission design the transmission will apply considerable forces and torques with probably changing directions to the machine shaft and also to the connecting structure. Weight forces and reactive moments must be introduced into the customer provided structure in a suitable form.

ASS AG is not responsible for the design and construction of connecting structures and foundations.

4 Transport, Packaging and Storage

4.1 Notes on safety

WARNING! Danger of injury!

Transport as well as loading and unloading activities always impose the risk of injury by falling down parts. The following notes on safety must therefore always be observed:

- **Always move the transmission with greatest care and caution.**
- **The transmission must only be lifted by the lifting points provided for this purpose (see dimension drawing).**
- **Use only lifting tackle of sufficient load bearing capacity.**
- **Ropes, belts or other lifting tackle must be fitted with safety hooks.**
- **Observe the centre of gravity when using ropes, belts or similar for transport.**
- **Do not lift by the shafts protruding from the transmission.**
- **Do not use any ropes showing signs of cracks chafe marks.**
- **Ropes and belts must be free of knots.**
- **Ropes and belts should not run across sharp edges.**
- **Do not lift loads over persons.**

4.2 Transport inspection

We recommend checking the complete delivery for completeness and possible transport damage immediately after arrival.

ATTENTION!

The liability of the insurer may become null and void if the following instructions for cases of damage are not observed.

– Even if there is only the suspicion of damage the delivery should only be accepted with reservations (e.g. shipping documents) with information about the expected damage. If goods are delivered in containers make sure that container and locks or seals are inspected by officials of the shipping company or the forwarding agent. If containers are damaged or locks and seals have been broken, are missing or deviate from the freight documents you should only accept the delivery with reservations and a description of the expected damage and keep damaged or incorrect locks and seals in a safe place.

– Ensure compensation claims against third parties.
Shipping company, other forwarders, haulage companies, warehouse companies, customs and harbour authorities
  - ask for mutual inspection of the damage,
  - ask for written confirmation of the damage,

- make liable in writing with detailed description of the damage,

meaning

– in case of externally visible damage before accepting the goods,
– in case of damage that is not visible from outside, directly after the detection.
– **Determine and comply with complaints deadlines.**

Ensure reduction for the already existing and avoidance of further damage

Immediately consult the instance specified in the insurance documents to inspect the damage and to receive advice for the assurance of compensation claims against third parties and for measures to reduce the damage.

Report the insurance claim immediately to the insurer and supply the insured with the complete damage documents as soon as possible (but at the latest in due time before the expiration of possible exclusion and/or limitation periods for compensation claims against third parties).

EXPLOSION PROTECTION!

In case of transport damage the transmission must not be taken into service. Consult ASS AG.

4.3 Packaging

The transmissions can be delivered in different types of packaging.

The main packaging materials are wood, cardboard and plastic materials (foils, foam rubbers), bust also steel straps (for coils). The packaging material also includes materials which are added to the packed goods for protection against moisture (e.g. bags of silicagel).

If no special arrangements concerning the return of the packaging material had been made, the packaging material will remain with the customer.

ATTENTION!

Waste disposal in compliance with the applicable waste disposal regulations must be assured. If necessary entrust a specialized waste disposal company with the correct disposal of the packaging material.

4.4 Unpacking and cleaning

The following points must be observed for unpacking and cleaning:

– Remove the packaging material without damaging the transmission and the attachment parts.
– Lift the transmission out of the packaging material by the lifting points specified in the drawing.

Metallic bright surfaces, such as shaft ends, hollow shaft bores and flanges or foot areas, are coated with corrosion protection agent. The following points must be observed before removing the corrosion protection:

– The corrosion protection must only be removed with a solvent and not by scratching or sanding.
– Take care not to damage radial seals with solvent.

4.5 Storage

The corrosion protection applied before shipment is of such nature, that the transmission can be installed in to the plant and taken into service, immediately after arrival. The transmission is delivered with an ex-factory corrosion protection:

– The internal conservation protects the transmission for max. 6 months.
– All exposed areas are either spray painted or coated with a corrosion protection.
– The transmission must only be stored under roof and in a closed room (T=0 °C to 30 °C, dry air). The floor of the storage room must be free of dust and dry. The formation of condensation water on transmission and packaging material must be avoided.
– Avoid mechanical shocks and damage.
– Outdoors storage of the transmission is only permitted after consulting ASS AG accordingly.

4.5.1 Storage over more than 6 months

If the transmission is stored for longer than 6 months additional measures are required:

– Remove the breather filter and fill the transmission completely (up to the breather filter) with the oil specified on the type plate. Then close it air-tight with a plug. (Before taking the transmission into service the oil level must be corrected as specified in the dimension drawing. The condition of the lubrication oil must also be checked and the lubrication may need to be changed).

– Check packaging and external conservation regularly (every 3 months) for damage, renew or repair as necessary.

– Transmission shafts and internal parts must be moved at regular intervals. We recommend rotating the drive shaft every 3 months as often as is required to rotate the output shaft by more than 360°.

4.5.2 Storage over more than 12 months

If the transmission is to be stored for longer than 12 months, the radial seals must be checked for leak tightness and brittleness and, if necessary, replaced, before the transmission is taken into operation. In addition the external conservation must be adapted to the extended storage conditions (consultation with ASS AG required).

See measures under **4.5.1**

5 Installation

WARNING! Danger of injury!

Installation and assembly work must only be performed by specially qualified personnel and in compliance with the safety regulations.

EXPLOSION PROTECTION!

For work on ATEX approved transmissions the following points must be observed:

- Installation, assembly and maintenance work must only be performed in a non-explosive atmosphere.
- Ask for a written permission before starting work.
- Use only tools which have been approved for use in explosion protected plants.
- Failure to meet these notes results in the loss of the explosion protection.

See chapter 2!

5.1 Requirements on the place of installation

Before installing the transmission one must check whether the installation location meets the following requirements:

– The foundation or connecting structure must be provided with suitable locating bolts (see transmission measuring sheet).

– Foundations or connecting structures must have sufficient rigidity and should not distort the component to be fastened when tightening the screws.

– Ensure sufficient dimensioning, size, flatness and correct positioning of the mounting surface.

– Vibrations or shocks from adjacent machines or plants must not be transferred to the transmission. The foundation/fastening structure must not be a source of resonance vibrations.

– There must be sufficient space for installation, maintenance and cleaning work.

WARNING!

Incorrect mounting or insufficient load bearing capacity of the connecting structure can lead to severe bodily injury or material damage.
Install the transmission only if the connecting structure has a sufficient load bearing capacity and suitable receiving bores.

5.2 Measures before installation

EXPLOSION PROTECTION!

Before installation, make sure that the transmission is complete and free of deformations and other damage, which would indicate that it had dropped down.

Failure to meet these notes results in the loss of the explosion protection.

WARNING!

The installation of a damaged or incomplete transmission can lead to severe bodily injury or material damage.
Install only a completely sound transmission.

In case of damage the transmission must not be taken into service. Consult ASS AG.

5.3 Installation

The following points must be observed before installing the transmission:

– Before installation check whether the correct transmission has been supplied with respect to the technical specifications.
– The installation of the transmission, the installation position and alignment must comply with the dimension drawing. Subsequent changing of the installation position is not permitted.

WARNING! Danger caused by electric current!

Current flowing through the transmission can cause severe injury in case of bodily contact. Attachment parts should therefore be separately grounded and never via the transmission.

ATTENTION!

Current flow through the transmission may cause damage. Electric attachments, such as motors, frequency inverters, etc. must be separately grounded to avoid a possible current flow. For the welding work the transmission must never be used as a ground point, because this could damage roller bearings and tooth flanks.

5.3.1 Attachment of quill drive with shrink disc

Shrink discs with single taper are used to assemble the transmission. However, if a different shrink disc design is to be used, the technical documentation will have additional instructions included. In as delivered condition the shrink disc is pushed over the quill shaft by the manufacturer without clamping and secured with a disc against falling off during transport.

ATTENTION!

Tightening the screws without the machine shaft inserted can damage the shrink disc.

Perform the following steps to install the transmission:

1. Before assembling the transmission remove the axial locking dics from the quill shaft.
2. Clean the quill shaft so that the mating surfaces are free of grease (see chapter **4.4**).
3. Lift the transmission by the specified lifting points with a suitable hoist.
4. Align the quill shaft of the transmission to the machine shaft and slide the transmission completely on.
5. Tighten the screws of the shrink disc one after the other in several cycles.
6. Apply the tightening torque specified in the dimension drawing.

Perform the following steps to remove the transmission:

1. Attach the lifting tackle to the specified lifting points on the transmission.
2. Loosen the screws of the shrink disc in several cycles, but do not unscrew completely.
3. If necessary turn adjacent screws into the forcing threads to separate the inner from the outer ring.
4. Once the pressure of the shrink disc has been relieved pull the transmission off the machine shaft (do not skew!).

5.3.2 Installation of torque support

The design of the torque support may vary with the transmission design. Corresponding information can be taken from the dimension drawing. The torque support may be mounted to the transmission or delivered separately.

ATTENTION!

Ensure sufficient stability, because the centre of gravity of the complete unit will change considerably after assembly.

Perform the following steps to assemble the torque support:

1. Before assembling the torque support the corrosion protection must be cleaned from all fastening areas/flange areas (see chapter **4.4**) and the areas must be free of grease.
2. Use appropriate lifting gear and tools to position the torque support above the centring on the transmission and push it on (observe additional notes in the dimension drawing!).
3. Use screws of strength class and length specified in the dimension drawing.
4. Tighten the screws successively in several cycles, take the specified tightening torque from the dimension drawing.

! ATTENTION!

Transmissions with torque support must under any circumstances be free of constraint.

5.3.3 Mounting of flange-type transmission

Perform the following steps to install the flange-type transmission:

1. Before assembling the flange-type transmission into the machine frame the corrosion protection must be cleaned from all fastening areas/flange areas (see chapter **4.4**) and the areas must be free of grease.
2. Attach suitable lifting gear to the lifting points specified in the dimension drawing, lift the transmission and place it in fastening position on the connecting structure, that has also been cleaned (observe the additional notes in the dimension drawing).
3. The exact alignment is made via the shaft axes by using appropriate measuring equipment.
4. Use screws of strength class and length specified in the dimension drawing.
5. Tighten the screws crosswise with the specified torque (see dimension drawing).
6. While tightening the screws do not constraint the transmission, check the alignment again and correct it if necessary.

5.3.4 Installation of foot-type transmission

The following points must be observed before installing the transmission:

1. Before assembling the flange-type transmission into the machine frame the corrosion protection must be cleaned from all fastening areas/flange areas (see chapter **4.4**) and the areas must be free of grease.

2. Lift the transmission by using appropriate lifting gear at the specified lifting points and position it in the fastening position of the connecting structure (observe the additional notes in the dimension drawing!).
3. The exact alignment is made via the shaft axes by using appropriate measuring equipment.
4. Use screws of strength class and length and washers specified in the dimension drawing.
5. Tighten the screws, the specified tightening torque can be taken from the dimension drawing.
6. While tightening the screws do not constraint the transmission, check the alignment again and correct it if necessary.

5.3.5 Oil lubrication system (option)

For the oil lubrication system, observe the attached additional documentation.

Perform the following steps to install the oil lubrication system:

1. If the oil lubrication system is not mounted to the transmission, it must be installed on a suitable foundation.
2. The oil lines must be installed as specified in the dimension drawing and should not be mounted under tension.
3. The electric wiring for the oil pump can be taken from the attached additional documentation for the corresponding components.

ATTENTION!

A wrong sense of rotation of the oil pump can lead to transmission damage.
Observe the attached additional documentation and the dimension drawing.

4. With water cooling the limits for water pressure, water quality and flow rate specified in the attached additional documentation and in the dimension drawing must be complied with.

ATTENTION!

Installation position and height of the cooler and/or the oil lubrication system can have a considerable effect on the function and must under no circumstances be changed without permission.
Observe the attached additional documentation and the dimension drawing.

EXPLOSION PROTECTION!

If the transmission is to be used in an explosion endangered environment, all components of the oil lubrication system must meet the conditions of directive 94/9/EG.

Failure to meet these notes results in the loss of the explosion protection.

5.4 Concluding work

After completion of installation work the following points must be observed:

– The user must protect rotating parts against touching.

EXPLOSION PROTECTION!

Transmissions with ATEX-approval must be fitted with equipotential bonding before commissioning.

Failure to meet this requirement results in the loss of the explosion protection.

6 Commissioning

WARNING! Danger of injury!

Commissioning must only be performed by specially qualified personnel and in compliance with the safety regulations.

EXPLOSION PROTECTION!

For work on ATEX approved transmissions the following points must be observed:

- Installation, assembly and maintenance work must only be performed in a non-explosive atmosphere.
- Ask for a written permission before starting work.
- Use only tools which have been approved for use in explosion protected plants.
- Failure to meet these notes results in the loss of the explosion protection.
- During assembly and disassembly work the environment must be free of explosive gas mixtures and dust concentrations. Failure to meet this requirement may result in the loss of the explosion protection.
- If the transmission is to be used in an explosion endangered environment, all attachments must meet the conditions of directive 94/9/EG.

Failure to meet this requirement may result in the loss of the explosion protection.

6.1 Oil filling

– The following points must be observed before filling the transmission:
– Grease lubrication points on the transmission have been filled with grease in the factory.
– The transmission is delivered without oil filling (if not agreed differently). Quantity and quality of oil (lubricant type and viscosity class) can be taken from the dimension drawing/type plate.
– Recommended lubricant see chapter 7.4.

ATTENTION!

Impurities in the lubricant can lead to transmission damage.
Fill in fresh oil through a 25 µm filter.

- For the oil filler bore refer to the dimension drawing.
- Check the oil level by means of oil lug, dipstick or inspection glass.
- Install plugs or breather as specified in the dimension drawing.
- Synthetic oils may only be used if this is specified in the dimension drawing and on the type plate (see chapter **7.4**).

ATTENTION!

Changing between mineral and synthetic oils can cause damage to plastic materials, paints and rubber materials.
Consult ASS AG before changing.

The mixing of oils from different manufacturers, types and different viscosities is prohibited.

6.2 Initial commissioning

The following points must be checked before initial commissioning.

- Make sure that all guards and safety installations are in place, correctly mounted and functioning.
- Check transmission and all components for tight fit and check the screw fittings.
- Make sure that the sense of rotation corresponds with the dimension drawing.
- The ambient temperature must be within the agreed range, if not you should consult ASS AG.
- If an oil system has been planned for operation, it should be running for 15 minutes before the transmission is switched on.
- Make sure that the oil system works correctly and without leaks.

6.3 Running in

The transmission can now be operated within the plant by observing all safety regulations.

– Start the transmission without load, if possible raise the rotary speed in two to three steps to nominal speed and hold it at this level.
– If no unusual behaviour is detected in this phase the load can be increased up to nominal torque/nominal speed.
– During this running-in phase watch the function and the operating status of the transmission under the following aspects. Uniformity of rotation, vibrations, running noises, maximum surface temperature, leaks and lubrication.
– Shut the transmission down if a fault is suspected, perform trouble shooting and repair the fault after consulting ASS AG.

EXPLOSION PROTECTION!

For running–in transmissions with ATEX-approval the following points must additionally be observed.

- When used in explosion endangered environments the maximum permissible surface temperature must be monitored.
- With safety installations make sure that components rotating towards each other do not touch and have a sufficient distance.
- Failure to meet these notes results in the loss of the explosion protection.
- With brake equipment installed it must be assured that the brake will not rub when released and that a sufficient brake pads have a sufficient thickness (see dimension drawing).

ATTENTION!

The maximum performance data and environmental parameters specified in the dimension drawing must be complied with and should not be exceeded.

7 Maintenance

The most important purpose of monitoring and maintenance is the early response to possible failures in order to maintain a reliable and safe operating condition of the transmission. This forward looking preventive maintenance includes the regular monitoring and inspection of the transmission during operation as well as the performance of scheduled maintenance work.
All tasks performed must be documented according to the following data:

- Date of assembly
- Initial filling, quality and quantity of oil
- Start and end of running-in as well as the detected peculiarities
- Date of commissioning as well as the related performance measurements
- Date of first oil change and operating hours
- Dates of all other oil changes and oil analyses
- Inspection reports including documentation of operating data
- Documentation of maintenance work

7.1 Safety

EXPLOSION PROTECTION!

For work on ATEX approved transmissions the following points must be observed:

- Installation, assembly and maintenance work must only be performed in a non-explosive atmosphere.
- Ask for a written permission before starting work.
- Use only tools which have been approved for use in explosion protected plants.
- Failure to meet these notes results in the loss of the explosion protection.

WARNING!

Work on the transmission must only be performed with transmission and plant shut down.

With all work related to operation, installation and maintenance the shut-down procedures described in these operating instructions and the necessary precautions must be strictly applied.

For any interruptions in operation the correct function of all necessary protective features must be assured.

After completing work on the transmission, please check that all safety installations are correctly in place and fulfil their function.

Safety features must never be bypassed or taken out of function!

WARNING!

Work on the transmission is only to be performed by qualified and specially trained personnel.

Always wear the following personal protective outfit when working near the transmission:

- **Tight fitting clothes (no wide arms, no rings, etc.)**
- **Protective goggles**
  to protect the eyes against flying parts and squirting out fluids
- **Safety boots**
  as protection against heavy, falling down parts and slipping on a slippery floor

WARNING! Danger caused by electric current!

Work on electric equipment must only be carried out by qualified professionals and in compliance with the applicable safety regulations.

Switch off the electric power supply and secure it reliably against being switched on again, before starting work.

WARNING! Danger of burning!

Due to the high temperatures on the transmission, there is a danger of burning. Do not touch the transmission during operation. Make sure that the transmission has cooled down to room temperature before starting maintenance and repair work.

ATTENTION!

Inappropriate cleaning work may cause damage to radial seals and contamination of the lubricant. Never use high pressure cleaning equipment for external cleaning of the transmission.

7.2 Monitoring the operating status

During operation the following inspections must be performed on the transmission in regular intervals and any irregularities must be recorded.

EXPLOSION PROTECTION!

Instructions marked with this symbol must be strictly observed for transmissions with the intended use acc. to ATEX.

Transmissions used in extremely dusty environments require regular temperature monitoring, because dust deposits on the transmission will restrict the discharge of heat and cause an excessive build-up of heat over the course of time. Clean the drives regularly from dirt.

Failure to meet these notes results in the loss of the explosion protection.

	Interval	Inspections	Comments
Ex	daily	max. housing temperature	must be <90°C
	weekly	correct oil level at rest	dimension drawing
	weekly	Change in transmission noise	
	weekly	Leak tightness	
	weekly	Effect of fan	
Ex	weekly	Operating parameters	see technical specification
	weekly	Oil filter contamination indicator (option)	
	every 3 months	Function of oil system, pressure, flow (option)	
	every 3 months	Function of oil cooler (option)	
	every 3 months	Vibrations	
	every 6 months	external damage	
	every 6 months	Safety equipment correctly assembled	
Ex	at least every 6 months	Remove external dirt	max. dust deposit 5 mm
	every 6 months	Check radial seals	
Ex	every 6 months	Adjustment of brakes	dimension drawing
	every 6 months	Check fastening screws for tight fit	dimension drawing
	every 6 months	Check the status of the lubricant use	Oil analysis

Due to the heating up of the fuel and the turbulences during operation the oil level is not correctly indicated during operation and should only be checked and corrected in the course of maintenance work and on a cold and resting transmission.

ATTENTION!
With housing temperatures above 90°C there is a risk of overheating.
Consult ASS AG immediately.

7.3 Maintenance plan

Maintenance work must be periodically performed as specified in the following table (see chapter 7.1).

Interval	**Maintenance work**	**Comments**
With every standstill	Check the oil level	
With oil change	Oil change	with optional oil filter
After 500 operating hours At the latest after 3 months	Oil change irrespective of oil type	
Every 3 months	Clean the breather filter (in case of excessive dirt more frequently)	
Every 6 months	Check the usability of the lubricant by means of an oil analysis concerning additive degradation, aging, contamination, water content, etc.	
Every 6 months	Lubricate the grease point	with optional grease nipples
1x annually	Inspection by ASS AG	Recommended
Mineral oils at the latest after 6000 operating hours or 1 year	Oil change when using mineral oils, as required after oil analysis	Observe specification/ recommendation of lubricant manufacturer
Synthetic oils at the latest after 20000 operating hours or 3 years	Oil change when using synthetic oils, as required after oil analysis	Observe specification/ recommendation of lubricant manufacturer
Every 2 years	Inspection of roller bearings and gears	Recommended
Every 2 years	Inspection of radial seals	Recommended

7.4 Lubricant recommendation

WARNING! Danger of poisoning!

Lubricants are harmful to health! Skin contact with oils and lubrication grease can cause skin damage (skin irritation, inflammation, allergies).

Therefore:

- **Observe the instructions and safety data sheets of the oil manufacturer!**
- **Avoid long-term, excessive and repetitive skin contact.**
- **Use suitable skin protection and skin care agents or wear oil proof gloves when handling lubricants.**
- **Rinse splashes of oil out of the eyes with lots of water!**
- **Wash lubricants off the skin with water and soap.**

WARNING! Danger of injury!

Lubricants on the floor are a potential danger source (because of the risk of slipping). Saw dust or oil absorbing agents should be spread to bind and remove the lubricants.

ASS AG gear units require CLP-quality gear oils according to DIN 51517-3 (ISO 6743-6 and -9, AGMA 9005-D94) for improvement of corrosion prevention and resistance to aging and which reduce wear in mixed friction. The oils have to fulfil the following tests:

- **Scuffing resistance in the FZG test according to DIN ISO 14635-1 (A/8.3/90), fail stage > 12**
- **Low speed wear resistance according to DGMK 377:**
  - stage 1-4, wear category low
  - stage 5, no wear increase to stage 4
  - pinion wear < 25 mg
- **FE8 ball bearing test according to DIN 51819-3 (D7.5/80-80) ball wear < 10 mg, cage wear < 100 mg**
- **Grey staining resistance according to FVA 54 I-IV, fail stage ≥ 10, GFT = high**
- **Flender foam test, foam increase < 15 %, 1 minute after test**
- **Seal compatibility: approval by Freudenberg**
- **Compatibility to 2 component poly epoxy paint**
- **Compatibility to ASS AG corrosion protection oil**

If no additional information is provided in the technical specifications/ dimension drawing, then ASS AG recommends using the lubricant from the accompanying table. These lubricants contain special additive packages for the lubrication of roller bearings, gears and other machine elements.

Based on ASS AG experience the recommended lubricants are fulfilling the above mentioned requirements. Due to the batch and quality fluctuations ASS AG cannot grant a guarantee for the safe and reliable operation of these lubricants. It is the sole responsibility of the lubricant manufacturer.

Mineral oils		
Manufact.	Brand name	Viscosity classes from / to
BP (Aral)	Degol BMB	ISO VG 150 - ISO VG 680
BP	Energol GR – XF	ISO VG 150 - ISO VG 680
BP (Castrol)	Alpha SP	ISO VG 150 - ISO VG 680
BP (Optimol)	Optigear BM	ISO VG 150 - ISO VG 680
BP (Tribol)	1100	ISO VG 150 - ISO VG 680
Fuchs	Renolin CLP	ISO VG 150 - ISO VG 680
Fuchs	Renolin CLP Plus	ISO VG 150 - ISO VG 680
Fuchs Lubritech	Gearmaster CLP	ISO VG 150 - ISO VG 680
Shell	Omala F	ISO VG 220 - ISO VG 460
Klüber	Klüberoil GEM 1 N	ISO VG 150 - ISO VG 680
Poly-α-Olefine (PAO)		
Manufact.	Brand name	Viscosity classes from / to
BP (Aral)	Degol PAS	ISO VG 150 - ISO VG 460
BP (Aral)	Enersyn EP-XF	ISO VG 150 - ISO VG 460
BP (Castrol)	Alphasyn EP	ISO VG 150 - ISO VG 680
BP (Optimol)	Optigear Synth. A	ISO VG 220 - ISO VG 460
BP (Optimol)	Optigear Synth. X	ISO VG 220 - ISO VG 460
BP (Tribol)	1710	ISO VG 220 - ISO VG 460
Exxonmobil	Mobil SHC	ISO VG 150 - ISO VG 460
Exxonmobil	Mobilgear SHC XMP	ISO VG 150 - ISO VG 680
Klüber	Klübersynth GEM 4 N	ISO VG 150 - ISO VG 680
Poly glycoles (PG)		
Manufact.	Brand name	Viscosity classes from / to
BP (Aral)	Degol GS	ISO VG 150 - ISO VG 680
BP (Tribol)	800	ISO VG 150 - ISO VG 680
Klüber	Klübersynth GH6	ISO VG 150 - ISO VG 680
Lubrication grease		

Manufact.	Brand name	Consistency classes
Aral	Lagerfett HL3	NLGI 3
FAG	Lagerfette Arcanol	NLGI 2, NLGI 3
Mobil	Mobilux EP2	NLGI 2

7.5 Maintenance work

7.5.1 Taking an oil sample

WARNING! Danger of burning!

Hot transmission oil can cause severe burns. Wear protective outfit when taking oil samples.

The oil sample must be taken at operating temperature and generally at the lowest point of the oil sump or, if available, from the oil drain tap. The removed oil quantity must be replenished.

7.5.2 Performing an oil change

See notes in chapter 6.1!

The durability of the lubricant decisively depends on the operating conditions (temperature, load, speed and contamination) and the oil type used in the transmission. The oil change intervals can therefore not be precisely specified. The manufacturer recommends to have the usability of the lubricant analysed at regular intervals. Your lubricant supplier will supply you with more detailed information

ATTENTION!

Changing between mineral and synthetic oils can cause damage to plastic materials, paints and rubber materials.
Consult ASS AG before changing.

The mixing of oils from different manufacturers, types and different viscosities is prohibited.

WARNING! Danger of burning!

Hot transmission oil can cause severe burns. Wear your protective outfit to change the oil.

The following points must be observed when changing oil:

- Perform the oil change at operating temperature, just after shutting the transmission down.
- Unscrew the oil drain plug identified in the dimension drawing from the lowest point of the transmission.
- Catch the lubricant with a suitable vessel.
- Dispose of fuels and lubricants, conserving and cleansing agents according to the valid environmental regulations.
- Keep the oil quantity remaining in the transmission as low as possible.
- When draining off old oil do not apply pressure to the transmission, as otherwise the plugs may be pressed out of their bores.
- With heavily contaminated lubricants the transmission must be flushed out again with fresh oil.
- Screw the oil drain plug back in and seal it properly.
- If the transmission is equipped with an oil system, the oil in oil lines, filter and cooler must also be changed.
- Clean the filter and replace it if necessary.
- Use only the oil type specified on the type plate.
- Adjust the oil level according to the oil level indicator (see dimension drawing) and close the filler opening again.
- If the transmission is fitted with an oil system, this should be run during filling, to fill all lines with oil.

7.6 Measures after maintenance work

After performing maintenance work and before switching the transmission back on the following points must be observed in compliance with all safety regulations:

- Check all previously loosened screw connections for tight fit.
- Check that all previously removed guards, covers, container covers have been properly reassembled.
- Make sure that all tools, materials and other equipment used has been removed from the working area.
- Clean the working area and remove any substances, such as fluids, work materials and similar, that may have leaked out.
- Make sure that all safety features of the machine are functioning correctly.

8 Trouble shooting

Faults on electric installations must only be rectified by qualified professionals. The same applies for faults in the areas of mechanics, pneumatics and hydraulics.

In case of faults that cannot be rectified by following the described measures you should consult ASS AG.

EXPLOSION PROTECTION!

For work on ATEX approved transmissions the following points must be observed:

- Installation, assembly and maintenance work must only be performed in a non-explosive atmosphere.
- Ask for a written permission before starting work.
- Use only tools which have been approved for use in explosion protected plants.
- Failure to meet these notes results in the loss of the explosion protection.

8.1 What to do in case of faults

In case of faults that impose a direct threat for persons, objects and the operating safety of transmission and plant, the transmission must be shut down immediately with EMERGENCY STOP function. In case of faults that do not impose such a threat, both transmission and plant can be shut down via the plant control.

The user must in any case be immediately informed about the fault. The user must order the appropriate expert personnel to perform trouble shooting and to rectify the fault.

The notes in chapter 7 must be observed before, during and after fault rectification work!

8.2 Fault rectification

Fault	possible cause	Remedy
Too high operating temperature	Oil level too high	Correct the oil level
	Oil level too low	Correct the oil level
	Oil aged	Change the oil
	Speed/load too high	Adjust the plant accordingly
	Dust deposits	Clean the transmission
Transmission noise	Gearing damaged	Consult ASS AG Service Department
Bearing noises	Bearings damaged	Consult ASS AG Service Department
Vibrations on transmission	Bearings damaged	Consult ASS AG Service Department
	Gearing damaged	Consult ASS AG Service Department
	Transmission fastening loose	Fasten the transmission
Oil leak on transmission	Radial seal defective	Replace the radial seal
	Oil fitting leaking	Retighten the fitting
	Gasket leaking	Replace the gasket
Alarm pressure switch	Oil pressure too low	Check the oil level Check the oil filter Check the function of the oil pump
Alarm contamination indicator	Oil filter dirty	Clean the filter and replace it if necessary. If a double switch-over filter is installed switch the filter over and clean or replace the dirty filter element.

9 Spare parts

If you require the service of our After Sales Service Department or spare parts during the lifetime of your transmission we ask you kindly to provide the following information together with your order:

- Serial number (see type plate)
- Transmission type (see type plate)
- Position number or article number (see assembly drawing or bill of material)
- exact description of problem

Please use only genuine spare parts from ASS AG.

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